OIPE IAP40
FEB 07 2006
PATENT & TRADEMARK OFFICE

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: Appeal to the Board of Patent Appeals and Interferences

In re PATENT application of
NAYLER

Group Art Unit: 2631

Application No. 10/002,185

Examiner: TORRES, Juan A.

Filed: December 5, 2001

Docket : 95-525

Title: Arrangement for Initializing Digital Equalizer Settings Based on Comparing Digital Equalizer Outputs to Prescribed Equalizer Outputs

Date: February 7, 2006

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1 [ ] **NOTICE OF APPEAL**: Applicant hereby appeals to the Board of Patent Appeals and Interferences from the decision (not Advisory Action) dated August 5, 2005 of the Examiner twice/finally rejecting claims

2 [X] **BRIEF** on appeal in this application attached.

3 [ ] An **ORAL HEARING** is respectfully requested under Rule 194 (due two months after Examiner's Answer unextendable).

4 [ ] Reply Brief is attached (due two months after Examiner's Answer -- unextendable).

5. **FEE CALCULATION**:		Large/Small Entity	
If box 1 above is X'd, see box 12 below first and decide: .... enter		$500/250*	$
If box 2 above is X'd, see box 12 below first and decide: .... enter		$500/250*	$ 500.00
If box 3 above is X'd, see box 12 below first and decide: .... enter		$1000/500*	$
If box 4 above is X'd, ... enter nothing		- 0 - (no fee)	
6. Original due date: January 7, 2006			
7. **Petition is hereby made** to extend the original due date to cover the date this response is filed for which the requisite fee is attached (1 mo) (2mos) (3mos) (4mos)	$120 $450 $1020 $1590	+ $120	
8. Enter any previous extension fee paid [ ] previously since above original due date (item 6); [ ] with concurrently filed amendment		-	
9. **Subtract line8 from line7 and enter: Total Extension Fee**			+$120
10. **TOTAL FEE ATTACHED =**			**$ 620**

11. [ ] *Fee NOT required if/since paid in prior appeal in which the Board of Patent Appeals and Interferences did not render a decision on the merits.

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order No. 50-0687 / 95-525 for which purpose a duplicate copy of this sheet is attached. This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed

Atty: [signature]
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O-I-P-E IAP40 FEB 07 2006 PATENT & TRADEMARK OFFICE

Docket No.: 95-525 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	:	
	:	
NAYLER	:	
	:	
Serial No.: 10/002,185	:	Group Art Unit: 2631
	:	
Filed: December 5, 2001	:	Examiner: TORRES, Juan A.

For: ARRANGEMENT FOR INITIALIZING DIGITAL EQUALIZER SETTINGS BASED ON COMPARING DIGITAL EQUALIZER OUTPUTS TO PRESCRIBED EQUALIZER OUTPUTS

MAIL STOP: APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

This is an appeal from the final rejection of claims 1-13 in the above-identified patent application.

This Appeal Brief is submitted as required by 37 C.F.R. §41.37. Appellant concurrently submits a 1-month petition for extension of time in accordance with 37 C.F.R. §41.37(e) and 37 CFR §1.136.

1. Real Party in Interest:

This application is assigned to Advanced Micro Devices, Inc., the real party of interest.

2. Related Appeals and Interferences:

02/08/2006 JADDU1 00000021 10002185
01 FC:1402 500.00 OP
120.00 OP

There are no other appeals or interferences known to Appellant that will directly affect or

be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of Claims:

Claims 1-13 are pending in this application. Claims 1-13 stand rejected by the Examiner, and claims 1-13 are appealed.

4. Status of any Amendment File Subsequent to Final Rejection:

No Amendment was filed in response to the Final Rejection. A Response to the Final Rejection was filed on September 14, 2005.

5. Summary of Claimed Subject Matter:

The claimed subject matter includes independent claims 1 and 6 and dependent claims 2-5 and 10-13. Independent claims 1 and 6 each specify a physical layer transceiver (PHY) (10 of Fig. 1) that retrieves retrieved signal samples (A/D 16 of Fig. 1 outputs signal samples, page 5, lines 15-17) from a prescribed network medium (12 of Fig. 1), where the prescribed network medium has an undetermined length. Independent claims 1 and 6 also each specify supplying equalizer settings (34 of Fig. 1) to a digital feedforward equalizer (28 of Fig. 1) configured for outputting equalized signal samples, and selectively changing (90, 96, 98 of Fig. 3) the supplied equalizer settings based on whether the equalized signal samples reach a prescribed equalization threshold (90 of Fig. 3, 66 of Fig. 2). In particular, each of the independent claims specify: (1) supplying a prescribed initial set of equalizer settings to the digital feedforward equalizer, (2) comparing the equalized signal samples relative to a prescribed ***equalization*** threshold, and (3) ***selectively*** changing the supplied equalizer settings, based on the comparing step, ***until the*** *equalized signal samples reach the* ***prescribed equalization threshold***.

The claimed subject matter addresses the problem of prior adaptive systems relying on unreliable symbol data in determining equalizer settings to overcome intersymbol interference from a network medium having an undetermined length (e.g., page 1, line 23 to page 2; line 12, page 5, line 31 to page 6, line 3). Hence, the claimed subject matter determines equalizer settings

without relying on recovery of symbols from the signal samples from other portions of the PHY (e.g., slicer, timing recovery unit, etc.) that may have not have completed initialization (e.g., page 2, lines 15-22; page 3, lines 3-4 and 14-23; page 6, lines 4-13). Further, the claimed subject matter improves efficiency in the PHY, relative to prior adaptive systems, by enabling independent initialization of the digital feed forward equalizer, concurrent with other portions of the PHY(page 3, lines 17-23; page 9, lines 1-8).

Hence, independent claim 1 specifies a method (Fig. 3, page 4, lines 16-17) in a physical layer transceiver (10 of Fig. 1, page 4, lines 19-21) coupled to a prescribed network medium (12 of Fig. 1) having an undetermined length (page 4, lines 21-24). The method includes supplying a prescribed initial set of equalizer settings (34 of Fig. 1, page 6, lines 18-25 and line 33 to page 7, line 1; 84 and 86 of Fig. 3, page 8, lines 14-19) to a digital feedforward equalizer (28 of Fig. 1, page 6, lines 6-9), the digital feedforward equalizer configured for outputting equalized signal samples based on equalizing retrieved signal samples, having encountered intersymbol interference by transmission via the prescribed network medium (page 5, lines 15-20), according to supplied equalizer settings (34 of Fig. 1, page 8, lines 16-20). The method also includes comparing (90 of Fig. 3, page 8, lines 20-24) the equalized signal samples relative to a prescribed equalization threshold (66 of Fig. 2, page 7, lines 19-33). The method also includes selectively changing the supplied equalizer settings, based on the comparing step (90, 96, 98 of Fig. 3, page 6, lines 26-32, page 7, lines 4-7, and page 8, lines 28-34), until the equalized signal samples reach the prescribed equalization threshold (90, 92, 94 of Fig. 3, page 6, line 33 to page 7, line 7; page 8, lines 24-27).

Claim 2 adds to the method of claim 1, wherein the supplying step includes supplying the prescribed initial set of equalizer settings based on a predetermined characterization of the prescribed network medium at a prescribed length (86 of Fig 3: "Min. / Max Cable Length" page 8, lines 16-18; 80 of Fig. 3, page 4, line 25 to page 5, line 8 and page 8, lines 3-5).

Claim 3 adds to the method of claim 2, wherein the selectively changing step includes successively supplying groups of equalizer settings based on the predetermined characterizations of the prescribed network medium at successively changing lengths, respectively (96 and 98 of

Fig. 3, page 6, lines 28-32, page 7, lines 4-7, page 8, lines 28-31).

Claim 4 adds to the method of claim 3, wherein the comparing step includes: generating a count interval (90 of Fig. 3, page 8, lines 28-29; 44 of Fig. 2, page 7, lines 8-11) representing reception of a statistically-based prescribed number of signal samples; first determining, within the count interval, a first number of the equalized signal samples (58 generates "count" 62 of Fig. 2, page 7, lines 19-27) having an absolute value that exceeds (determined by 56 of Fig. 2, page 7, lines 14-16) a first reference level (60 of Fig. 2, page 7, lines 16-24) representing a location where a statistically substantial number of the data values representing a symbol absolute value of "1" should occur for an equalized signal; and second determining whether the first number ("count" 62 of Fig. 2) reaches the prescribed equalization threshold (66 of Fig. 2), the prescribed equalization threshold representing an expected number of detected signal samples that exceed the first reference level within the count interval (page 7, lines 19-33).

Claim 5 adds to the method of claim 1, wherein the comparing step includes: generating a count interval (90 of Fig. 3, page 8, lines 28-29; 44 of Fig. 2, page 7, lines 8-11) representing reception of a statistically-based prescribed number of signal samples; first determining, within the count interval, a first number of the equalized signal samples (58 generates "count" 62 of Fig. 2, page 7, lines 19-27) having a first absolute value that exceeds (determined by 56 of Fig. 2, page 7, lines 14-16) a first reference level (60 of Fig. 2, page 7, lines 16-24) representing a location where a statistically substantial number of the data values representing an absolute symbol value of "1" should occur for an equalized signal; and second determining whether the first number ("count" 62 of Fig. 2) reaches the prescribed equalization threshold (66 of Fig. 2), the prescribed equalization threshold representing an expected number of detected signal samples that exceed the first reference level within the count interval (page 7, lines 19-33).

Independent claim 6 specifies a physical layer transceiver (10 of Fig. 1, page 4, lines 19-21) configured for retrieving signal samples (A/D 16 of Fig. 1 outputs signal samples, page 5, lines 15-17) from a prescribed network medium (12 of Fig. 1) having an undetermined length (page 4, lines 21-24). The physical layer transceiver comprises a digital feedforward equalizer (28 of Fig. 1, page 5, lines 28-29; page 6, lines 6-9) configured for generating equalized signal

samples from the retrieved signal samples and based on supplied equalizer settings (34 of Fig. 1, page 6, lines 6-9, 18-25 and 30-32; page 8, lines 16-19), the retrieved signal samples having encountered intersymbol interference by transmission via the prescribed network medium(page 5, lines 15-20). The physical layer transceiver also comprises an equalizer controller (30 of Figs. 1 and 2, page 6, lines 6-10 and 14-15) configured for supplying the supplied equalizer settings to the digital feedforward equalizer (34 of Fig. 1, page 6, lines 14-19), the equalizer controller configured for supplying a prescribed initial set of equalizer settings (page 6, lines 18-25 and line 33 to page 7, line 1; 84 and 86 of Fig. 3, page 8, lines 14-19) and comparing (90 of Fig. 3, page 8, lines 20-24) the equalized signal samples, having been generated based on the initial set of equalizer settings, relative to a prescribed equalization threshold (66 of Fig. 2, page 7, lines 19-33), the equalizer controller configured for selectively changing the supplied equalizer settings (90, 96, 98 of Fig. 3, page 6, lines 26-32, page 7, lines 4-7, and page 8, lines 28-34) until the equalized signal samples reach the prescribed equalization threshold (90, 92, 94 of Fig. 3, page 6, line 33 to page 7, line 7; page 8, lines 24-27).

Claim 7 adds to the transceiver of claim 6, wherein the equalizer controller (30 of Fig. 2) includes a coefficients generator (40 of Fig. 2, page 6, lines 14-17) configured for outputting the prescribed initial set of equalizer settings (86 of Fig. 3, page 8, lines 16-18; page 6, lines 18-25) and the selectively changed equalizer settings (98 of Fig. 3, page 6, lines 26-32, page 7, lines 4-7, page 8, lines 28-31) based on a predetermined characterization of the prescribed network medium at respective prescribed lengths (80 of Fig. 3, page 4, line 25 to page 5, line 8 and page 8, lines 3-5).

Claim 8 adds to the transceiver of claim 7, wherein the equalizer controller (30 of Fig. 2) further comprises a controller state machine (42 of Fig. 2, page 6, lines 14-17) configured for asserting an initial signal ("init_coef" 50 of Fig. 2, page 6, lines 19-22; page 8, lines 14-19) at initialization of the digital feedforward equalizer and a change signal ("inc_HF_gain" 52 of Fig. 2, page 6, lines 26-32, page 7, lines 1-4, 96 of Fig. 3, page 8, lines 28-31) based on a comparison result between the equalized signal samples and the prescribed equalization threshold (90 of Fig. 3, page 8, lines 23-34), the coefficients generator configured for outputting a corresponding

group of equalizer settings representing a successively changing network medium length in response to each corresponding assertion of the change signal (96 and 98 of Fig. 3, page 6, lines 28-32, page 7, lines 4-7, page 8, lines 28-31).

Claim 9 adds to the transceiver of claim 8, wherein the equalizer controller further comprises a timer (44 of Fig. 2, page 7, lines 8-11) configured for generating a count interval representing reception of a statistically-based prescribed number of signal samples. The equalizer controller also comprises a counter (58 of Fig. 2, page 7, line 12) configured for determining, within the count interval (90 of Fig. 3, page 7, lines 19-27, page 8, lines 28-29), a first number ("count" 62 of Fig. 2, page 7, lines 19-27) of the equalized signal samples having an absolute value that exceeds (determined by 56 of Fig. 2, page 7, lines 14-16) a first reference level (60 of Fig. 2, page 7, lines 16-24) representing a location where a statistically substantial number of the data values representing a symbol absolute value of "1" should occur for an equalized signal (page 7, lines 14-24). The equalizer controller also comprises a comparator (48 of Fig. 2, page 7, lines 25-33) configured for outputting an equalization status signal (64 of Fig. 2, page 7, lines 31-33) based on whether the first number reaches the prescribed equalization threshold (92 of Fig. 3, page 8, lines 24-27), the prescribed equalization threshold representing an expected number of detected signal samples that have an absolute value exceeding the first reference level within the count interval (page 7, lines 19-33), the controller state machine selectively asserting the change signal based on the equalization status signal (page 8, lines 24-27).

Claim 10 adds to the method of claim 1, wherein the prescribed equalization threshold represents an expected number of detected signal samples having been detected within a prescribed count interval (page 7, lines 8-11) and having an absolute value exceeding a reference level (60 of Fig. 2, page 7, lines 19-33).

Claim 11 adds to the method of claim 10, wherein the reference level identifies a prescribed minimum value necessary for an ideal equalized signal sample to be detected as a prescribed data value (page 7, lines 16-19).

Claim 12 adds to the transceiver of claim 6, wherein the prescribed equalization threshold

represents an expected number of detected signal samples been detected within a prescribed count interval (page 7, lines 8-11) and having an absolute value exceeding a reference level (60 of Fig. 2, page 7, lines 19-33).

Claim 13 adds to the transceiver of claim 12, wherein the reference level identifies a prescribed minimum value necessary for an ideal equalized signal sample to be detected as a prescribed data value (page 7, lines 16-19).

6. <u>Grounds of Rejection to be Reviewed on Appeal</u>:

A. Whether claims 1-13 are unpatentable under 35 U.S.C. §102(b) as having been anticipated in view of U.S. Patent No. 6,097,767 to Lo et al.

7. <u>Arguments</u>:

A. **Claims 1 and 6 are not anticipated 35 U.S.C. §102(b) in view of Lo et al.**

In the Final Office Action, the Examiner rejected independent claims 1 and 6 under 35 USC §102(b) in view of Lo et al. Claims 1 and 6 are neither anticipated nor rendered obvious by Lo et al. for the following reasons.

A1. **Lo et al. Does Not Disclose or Suggest the Claimed Selectively Changing the Equalizer Settings Until the Equalized Signal Samples Reach the Prescribed Equalization Threshold**

Independent claims 1 and 6 each specify a digital feedforward equalizer configured for generating equalized signal samples from the retrieved signal samples and according to supplied equalizer settings. Independent claims 1 and 6 also specify (1) supplying a prescribed initial set of equalizer settings to the digital feedforward equalizer, and (2) comparing the equalized signal samples relative to a prescribed ***equalization*** threshold. Each independent claim 1 and 6 also specifies ***selectively changing*** the supplied equalizer settings, based on the comparing step, ***until*** *the equalized signal samples reach the* ***prescribed equalization threshold***.

As described on page 3, lines 14-23 of the specification, the claimed supplying of initial

settings to a digital ***feedforward*** equalizer enables the equalization of the retrieved signal samples, *regardless of whether other portions of the physical layer transceiver, such as the slicer, timing recovery unit, etc., have been able to begin recovery of information from the retrieved signal samples.* Moreover, ***the selective changing of the supplied equalizer settings until the equalized signal samples reach the prescribed equalization threshold*** enables the independent initialization of the digital feedforward equalizer, enabling other portions such as the timing recovery unit to begin recovery of information concurrent with the independent initialization of the digital feedforward equalizer.

Hence, the claimed digital feedforward equalizer enables rapid convergence based on the independent initialization by selectively changing the supplied equalizer settings until the prescribed equalization is reached, while minimizing the introduction of instability due to unsettled data (see, e.g., page 5, line 31 to page 6, line 3 of the specification).

The Examiner has the burden of establishing that Lo et al. discloses each and every element of the claim such that the identical invention must be shown in as complete detail as is contained in the claim.[1] Further, Further, anticipation cannot be established based on a piecemeal application of the reference, where the Examiner picks and chooses isolated features of the reference in an attempt to synthesize the claimed invention.[2] In other words, it is not sufficient that a single prior art reference discloses each element that is claimed, but the reference

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[1]As specified in MPEP §2131: "'A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference' *Verdegaal Bros. V. Union Oil Co. of California,* 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). ... 'The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." MPEP 2131 (Rev. 3, Aug. 2005, at p. 2100-76).

[2] "Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim." *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984). "Anticipation cannot be predicated on teachings in the reference which are vague or based on conjecture." *Studiengesellschaft Kohle mbH v. Dart Industries, Inc.*, 549 F. Supp. 716, 216 USPQ 381 (D. Del. 1982), *aff'd.*, 726 F.2d 724, 220 USPQ 841 (Fed. Cir. 1984).

also must disclose that the elements are arranged as in the claims under review. *In re Bond*, 15 USPQ2d 1566, 1567 (Fed. Cir. 1990) (citing *Lindemann Maschinenfabrik GmbH*).

In other words, the Examiner has the burden of establishing not only that Lo et al. discloses a digital feedforward equalizer, as claimed, but also that any digital feedforward equalizer disclosed in Lo et al. also is supplied equalizer settings ***in the same manner as claimed.*** As described below, the issue of whether Lo et al. describes the claimed digital feedforward equalizer is not dispositive, because Lo et al. still fails to disclose or suggest the claimed supplying a prescribed initial set of equalizer settings to the digital feedforward equalizer, comparing the equalized signal samples relative to a prescribed ***equalization*** threshold in combination with ***selectively changing*** the supplied equalizer settings, based on the comparing step, ***until** the equalized signal samples reach the **prescribed equalization threshold**.*

Lo et al. describes in Fig. 1 a prior art receiver 12 having an equalizer 16 for equalizing received data signals, and in Fig. 2 a preferred receiver 30 having an equalizer 32 for determining an optimum equalizer setting. At issue is how the equalizer 16 or 32 receives the equalizer settings that are to generate an equalized signal.

A1(i) Lo et al.'s Prior Art Receiver Does Not Disclose the Claimed Selectively Changing

Lo et al. describes that the prior art equalizer 16 of Fig. 1 relies on estimating a cable length based on **attenuation characteristics** of the **received signal**:

> The equalizer 16 attempts to compensate for the attenuation and intersymbol interference based on predetermined cable length settings, specified by the cable length detector 18. The cable length detector 18 detects the length of the cable medium 14 by monitoring the input waveform from the medium 14, and estimating the cable length of the medium 14 based on the attenuation characteristics, for example the signal amplitude or rise time (e.g., slew rate) of the signal.
>
> (Col. 1, lines 36-43).

Lo et al. also describes with respect to the prior art equalizer 16 that "it is important for high speed receivers to correctly determine the cable length in order to perform proper

equalization so that the incoming data signal can be recovered by the PLL 20." (Col. 1, lines 55-58). "If the data signal received from the medium 14 is not properly equalized, the attenuation and intersymbol interference will show up as jitter in the equalized signal" (col. 2, lines 6-9).

Lo et al. refers to the prior art receiver 12 that relies on cable length estimation <u>based on attenuation characteristics</u> as an open loop system:

> A problem with the receiver 12 of FIG. 1 is that the cable length is detected via an open loop. In other words, there is no feedback as to whether or not the equalizer setting selected by the cable length detector 18 is the optimal equalizer setting to use to minimize jitter. Hence, the cable length detector 18 may not select the optimum equalizer setting, causing additional jitter to be introduced into the equalized signal.
>
> (Col. 2, lines 13-17).

Hence, the prior art receiver 12 of Lo et al. does not disclose the claimed "comparing the equalized signal samples relative to a prescribed equalization threshold" because the equalizer 16 outputs the equalized signal samples only to the PLL 20 with no evaluation thereof. Further, the prior art receiver 12 of Lo et al. does not disclose the claimed "selectively changing the supplied equalizer settings", as claimed, because the equalizer 16 is set by the cable length detector 18 estimating the cable length by the **<u>attenuation characteristics of the received signal</u>**.

<u>A1(ii) Lo et al.'s Equalizer 32 and Equalizer Controller 32 Do Not Disclose the Claimed Selectively Changing</u>

Lo et al. discloses in Figs. 2 and 3 a "closed loop system"[3], where <u>each and every equalizer setting is evaluated to determine the equalizer setting creating the minimum jitter in the PLL 34</u>:

> These and other needs are attained by the present invention, where the distribution of an input signal edge relative to a recovered clock signal is used to determine the amount of jitter encountered for an equalizer setting, and where an optimum equalizer setting is selected based on **the normalized distribution results <u>for the respective equalizer settings</u>**.

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[3]The term "closed loop" is described in the Abstract at lines 10-13; col. 2, lines 30-34, and col. 3, lines 16-24).

(Col. 2, lines 35-41).

A normalized distribution result is determined **for each of the predetermined equalizer settings** based on a corresponding set of the correlation results for a predetermined number of the detected edges.... Receiving the correlation result that specifies the timing correlation of a detected edge of the equalized signal relative to the recovered clock signal enables **determination of a normalized distribution result for each of the predetermined equalizer settings**. Hence, the normalized distribution result can be used to quantify the amount of jitter encountered by the phase locked loop **for each equalizer setting**, enabling selection of the optimum equalizer setting having the minimum amount of jitter based on the corresponding normalized distribution result.

(Col. 2, lines 52-55 and 57-67).

The equalizer controller is configured for selecting an optimum equalizer setting based on the correlation results for **each of the equalizer settings** over a prescribed interval, where **the equalizer controller calculates for each of the equalizer settings a normalized distribution result**, and selects the optimum equalizer setting based on the corresponding normalized distribution result. Use of the correlation result from the phase locked loop enables the equalizer controller to determine the optimum equalizer setting using a closed-loop system, where each equalizer setting is used to determine the corresponding normalized distribution result.

(Col. 3, lines 9-21).

The state machine [of Fig. 5] moves from the try next setting state 80 to the count transition state 76, such that the equalizer controller 36 determines the normalized distribution result for **each of the predetermined equalizer settings** based on the corresponding set of correlation results (SEG) for a predetermined number (SAMPLE_LIMIT) of the detected edges. **Once the equalizer setting (eq_setting) reaches *the last setting (e.g., MAX) corresponding to the equalizer setting for the longest cable length*, the equalizer controller 36 executes the update measurement state 78, if necessary, and enters the lock on best state 82 where the optimum equalizer setting (best_setting) is selected from the predetermined equalizer settings based on the corresponding normalized distribution result having a minimum value (best.sub_count).**

According to the disclosed embodiment, an optimum equalizer setting is determined for a signal equalizer by successively setting the equalizer to different predetermined settings, **and determining the normalized distribution result for each of the predetermined equalizer settings based on timing correlation results output**

by the digital phase locked loop.

(Col. 7, lines 14-34).

Hence, Lo et al. consistently and unequivocally requires that each and every equalizer setting be provided to the equalizer 32 in order to determine the corresponding equalizer setting providing the minimum jitter in the digital PLL 34 (see also col. 5, lines 18-27; col. 6, lines 21-24; col. 7, lines 28-34; col. 8, lines 59-62; col. 10, lines 22-25; col. 11, line 22 to col. 12, line 2).

In contrast, each of the independent claims 1 and 6 specify ***selectively*** changing the supplied equalizer settings ***until*** the equalized signal samples reach the prescribed equalization threshold. Hence, independent claims 1 and 6 explicitly require that, once the equalized signal samples reach the ***prescribed equalization threshold***, the supplied equalizer settings are ***no longer changed!***

Hence, Lo et al. cannot disclose the claimed "selectively changing the supplied equalizer settings until the equalized signal samples reach the prescribed equalization threshold" because Lo et al. requires that each and every equalizer setting be provided to the equalizer 32 to determine the **optimum equalizer setting providing the minimum jitter**. Such a stringent requirement (determining the optimum equalizer setting) is not necessary in the claimed subject matter, because the independent claims 1 and 6 require only that the equalized signal samples "reach the prescribed ***equalization threshold***" (described in further detail below).

A1(iii) The Rejection Fails to Identify the Claimed Selectively Changing

The §102 rejection fails to establish that Lo et al. discloses the claimed "selectively changing the supplied equalizer settings until the equalized signal samples reach the prescribed equalization threshold", and in fact ignores this essential element of ***selectively*** changing the supplied equalizer settings. In particular, the rejection cited col. 7, lines 30-31 as disclosing the claimed selectively changing the supplied equalizer settings.

However, as shown *supra*, the quoted portion of Lo et al. at col. 7, lines 14-34 explicitly

specify "**successively setting** the equalizer to different predetermined settings**, and determining the normalized distribution result for each of the predetermined equalizer settings based on timing correlation results output by the digital phase locked loop.**" While this may be a disclosure of *changing* the supplied equalizer settings, it is not a disclosure of ***selectively*** changing the supplied equalizer settings, as claimed.

The rejection also cited col, 4, lines 61-64, which states:

> According to the disclosed embodiment, the equalizer controller 36 counts the number of transitions occurring in any of the four segments 48, 50, 52, 54, and selects as an optimal equalizer setting **the one predetermined equalizer setting that results in the minimum number of transitions** occurring in the outer regions 48 and 54.

As described above, however, Lo et al. specifically requires that "the one predetermined equalizer setting that results in the minimum number of transitions" is determined by determining the normalized distribution result for each and every predetermined equalizer setting.

Further, Examiner disregards the claimed ***"selectively*** changing" by acknowledging the very deficiency of Lo et al.: "what [Lo et al] discloses is ... an **optimum equalizer setting** is determined for a signal equalizer ... by **successively setting the equalizer to different predetermined settings** .. (abstract)." (See Aug. 5, 2005 Final Action at page 3, first full paragraph).

Hence, the deliberate disregard of the claimed "***selectively*** changing" is reversible error because "[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

A2. Lo et al. Does Not Disclose or Suggest the Claimed Equalization Threshold

Lo et al. neither discloses nor suggests the claimed comparing the equalized signal samples relative to a prescribed ***equalization*** threshold. The prescribed ***equalization*** threshold represents "stable, equalized signal samples" such that the signals samples are equalized "to a sufficient equalized level to ensure that the slicer 22 can output reliable data" (page 6, lines 9-12)

(see page 7, lines 25-33 and page 8, lines 20-27 for an exemplary implementation of the prescribed equalization threshold 66). The broadest *reasonable* interpretation must be (1) consistent with the specification, and (2) consistent with the interpretation that those skilled in the art would reach.[4] Hence, the claimed prescribed ***equalization*** threshold requires a threshold that represents stable, equalized signal samples.

As described above, Lo et al. requires each and every equalizer setting to be evaluated to determine a <u>minimum jitter</u>, and provides no disclosure or suggestion of comparing equalized signal samples to any type of threshold to determine whether the supplied equalizer settings should be "selectively changed" until the equalized signal samples "reach the prescribed equalization threshold."

The rejection cites column 6, lines 1-4 as teaching the claimed "prescribed equalization threshold"; however, the cited portion describes a <u>signal detection signal</u> that identifies whether <u>a cable is connected to the receiver</u>:

> [T]he equalizer 32 also outputs a reset signal and a detection signal (SIG_DET), which may be used by the equalizer 36 ***to detect an initialization condition*** in the equalizer controller 32, for example a reset state ***or a disconnect state***.
>
> (Col. 4, lines 1-5).
>
> As shown in FIG. 5, the state machine includes a link down state 72, executed by the equalizer controller 36 in response to reception of either a reset signal or ***deassertion of the signal detect signal (SIG_DET), indicating no signal is present on the medium 14***.
>
> (Col. 5, lines 33-37).

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[4]"During patent examination, the pending claims must be 'given their broadest reasonable interpretation consistent with the specification.'" MPEP §2111 at 2100-46 (Rev. 3, Aug. 2005) (*quoting In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000)).

"The broadest reasonable interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach." MPEP §2111.01 at 2100-47 (Rev. 3, Aug. 2005) (*citing In re Cortright*, 165 F.3d 1353, 1359, 49 USPQ2d 1464, 1468 (Fed. Cir. 1999)).

> The equalizer controller 36 remains the link down state 72 until reception of the detection signal (SIG_DET). The detection signal SEG_DET [sic] is a logical signal output by the equalizer 32 that indicates that signal transitions are occurring above a defined threshold, ***for example when a cable is connected to the receiver 30***.
>
> (Col. 5, line 66 to col. 6, line 4).

Hence, the "threshold" in Lo et al. refers to a basic signal threshold to indicate that the a cable is connected to the receiver, and <u>not</u> the claimed "prescribed ***equalization*** threshold". Hence, Lo et al. neither discloses nor suggests that claimed "prescribed ***equalization*** threshold".

Also note that Fig. 1 of the subject application uses a "sig_det" signal that is output from the AGC 18 to the receiver controller 32, which is distinguishable from the prescribed ***equalization*** threshold 66 that represents the threshold needed for "stable, equalized signal samples" such that the signals samples are equalized "to a sufficient equalized level to ensure that the slicer 22 can output reliable data" (page 6, lines 9-12) (see also page 7, lines 25-33 and page 8, lines 20-27).

Hence, the claimed "prescribed ***equalization*** threshold" cannot be so broadly construed as to remove the term "equalization": the specification <u>distinguishes</u> between simple signal detection (sig_det) and the ***equalization*** threshold.

Since Lo et al. does not disclose <u>each and every claim limitation</u>, this rejection must be withdrawn, since <u>all words must be considered</u>. *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

For these and other reasons, the §102 rejection of independent claims 1 and 6 should be withdrawn.

B. Lo et al. Does Not Disclose the Claimed Prescribed Equalization Threshold of Claims 4-5, 9-13

Lo et al. neither discloses nor suggests the claimed prescribed equalization threshold that represents an expected number of detected signal samples having been detected within a prescribed count interval and having an absolute value exceeding a reference level, as specified in claims 4-5 and 9-13.

In particular, claims 4-5 and 9-13 specify that the claimed equalization threshold is based on ***another threshold***, namely the "reference level", and represents an ***expected number of detected signal samples*** to be detected within a prescribed count interval and exceeding the reference level. Hence, not only must the equalized signal samples exceed the reference level, but also the number of equalized signal samples that exceed the reference level must exceed the "expected number".

Lo provides no reference whatsoever to any "absolute value", let alone the claimed location where a statistically substantial number of the data values ***representing a symbol absolute value of "1"*** should occur for an equalized signal. Lo relies on identifying timing relationships between a equalized signal edge 40 and an edge 44 of the recovered clock. Column 6 of Lo describes identifying whether the timing relationship for each signal edge 40 falls within one of the ***distribution regions*** 48, 50, 52, 54, used to identify ***jitter***.

Further, Lo et al. provides no disclosure or suggestion whatsoever with respect to any ***expected number of detected signal samples***, because Lo et al. identifies the equalizer having the minimum jitter: other than estimating cable length by the prior art detector 18, Lo et al. provides no reference whatsoever to any expected value or estimated value. Hence, Lo et al. neither discloses nor suggests the claimed claimed prescribed equalization threshold that represents an expected number of detected signal samples having been detected within a prescribed count interval and having an absolute value exceeding a reference level, as specified in claims 4-5 and 9-10 and 12.

Conclusion

For the reasons set forth above, it is clear that Appellant's claims 1-13 are patentable over the reference applied. Accordingly the appealed claims 1-13 should be deemed patentable over the applied reference. It is respectfully requested that this appeal be granted and that the Examiner's rejections be reversed.

To the extent necessary, Appellant petitions for an extension of time under 37 C.F.R. 1.136 and 37 C.F.R. 41.37(e). Please charge any shortage in fees due in connection with the filing of this paper, including any missing or insufficient fees under 37 C.F.R. 1.17(a) or 41.20(b)(2), to Deposit Account No. 50-0687, under Order No. 95-525, and please credit any excess fees to such deposit account.

Respectfully submitted,

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APPENDIX – CLAIMS ON APPEAL

1. (ORIGINAL) A method in a physical layer transceiver coupled to a prescribed network medium having an undetermined length, the method comprising:

supplying a prescribed initial set of equalizer settings to a digital feedforward equalizer, the digital feedforward equalizer configured for outputting equalized signal samples based on equalizing retrieved signal samples, having encountered intersymbol interference by transmission via the prescribed network medium, according to supplied equalizer settings;

comparing the equalized signal samples relative to a prescribed equalization threshold; and

selectively changing the supplied equalizer settings, based on the comparing step, until the equalized signal samples reach the prescribed equalization threshold.

2. (ORIGINAL) The method of claim 1, wherein the supplying step includes supplying the prescribed initial set of equalizer settings based on a predetermined characterization of the prescribed network medium at a prescribed length.

3. (ORIGINAL) The method of claim 2, wherein the selectively changing step includes successively supplying groups of equalizer settings based on the predetermined characterizations of the prescribed network medium at successively changing lengths, respectively.

4. (ORIGINAL) The method of claim 3, wherein the comparing step includes:

generating a count interval representing reception of a statistically-based prescribed number of signal samples;

first determining, within the count interval, a first number of the equalized signal samples having an absolute value that exceeds a first reference level representing a location where a statistically substantial number of the data values representing a symbol absolute value of "1"

should occur for an equalized signal; and

second determining whether the first number reaches the prescribed equalization threshold, the prescribed equalization threshold representing an expected number of detected signal samples that exceed the first reference level within the count interval.

5. (ORIGINAL) The method of claim 1, wherein the comparing step includes:

generating a count interval representing reception of a statistically-based prescribed number of signal samples;

first determining, within the count interval, a first number of the equalized signal samples having a first absolute value that exceeds a first reference level representing a location where a statistically substantial number of the data values representing an absolute symbol value of "1" should occur for an equalized signal; and

second determining whether the first number reaches the prescribed equalization threshold, the prescribed equalization threshold representing an expected number of detected signal samples that exceed the first reference level within the count interval.

6. (ORIGINAL) A physical layer transceiver configured for retrieving signal samples from a prescribed network medium having an undetermined length, the physical layer transceiver comprising:

a digital feedforward equalizer configured for generating equalized signal samples from the retrieved signal samples and based on supplied equalizer settings, the retrieved signal samples having encountered intersymbol interference by transmission via the prescribed network medium; and

an equalizer controller configured for supplying the supplied equalizer settings to the digital feedforward equalizer, the equalizer controller configured for supplying a prescribed initial set of equalizer settings and comparing the equalized signal samples, having been generated based on the initial set of equalizer settings, relative to a prescribed equalization threshold, the equalizer controller configured for selectively changing the supplied equalizer

settings until the equalized signal samples reach the prescribed equalization threshold.

7. (ORIGINAL) The transceiver of claim 6, wherein the equalizer controller includes a coefficients generator configured for outputting the prescribed initial set of equalizer settings and the selectively changed equalizer settings based on a predetermined characterization of the prescribed network medium at respective prescribed lengths.

8. (ORIGINAL) The transceiver of claim 7, wherein the equalizer controller further comprises a controller state machine configured for asserting an initial signal at initialization of the digital feedforward equalizer and a change signal based on a comparison result between the equalized signal samples and the prescribed equalization threshold, the coefficients generator configured for outputting a corresponding group of equalizer settings representing a successively changing network medium length in response to each corresponding assertion of the change signal.

9. (ORIGINAL) The transceiver of claim 8, wherein the equalizer controller further comprises:

a timer configured for generating a count interval representing reception of a statistically-based prescribed number of signal samples;

a counter configured for determining, within the count interval, a first number of the equalized signal samples having an absolute value that exceeds a first reference level representing a location where a statistically substantial number of the data values representing a symbol absolute value of "1" should occur for an equalized signal; and

a comparator configured for outputting an equalization status signal based on whether the first number reaches the prescribed equalization threshold, the prescribed equalization threshold representing an expected number of detected signal samples that have an absolute value exceeding the first reference level within the count interval, the controller state machine selectively asserting the change signal based on the equalization status signal.

10. (PREVIOUSLY PRESENTED) The method of claim 1, wherein the prescribed equalization threshold represents an expected number of detected signal samples having been detected within a prescribed count interval and having an absolute value exceeding a reference level.

11. (PREVIOUSLY PRESENTED) The method of claim 10, wherein the reference level identifies a prescribed minimum value necessary for an ideal equalized signal sample to be detected as a prescribed data value.

12. (PREVIOUSLY PRESENTED) The transceiver of claim 6, wherein the prescribed equalization threshold represents an expected number of detected signal samples been detected within a prescribed count interval and having an absolute value exceeding a reference level.

13. (PREVIOUSLY PRESENTED) The transceiver of claim 12, wherein the reference level identifies a prescribed minimum value necessary for an ideal equalized signal sample to be detected as a prescribed data value.